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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,492	07/08/2003	Yao-Sheng Lee	074361.00015	9712

7590

03/03/2006

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EXAMINER

TRAN, BINH X

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/616,492

Applicant(s)

LEE, YAO-SHENG

Examiner

Binh X. Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 8-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2-14-2006 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. (US 2003/0066817) in view of Athavale et al. (US 2002/0094690).

Respect to claim 8, Tanabe discloses anisotropically dry etching a vertical feature in a semiconductor substrate, method comprising the steps of:

depositing a mask on the semiconductor substrate (resist mask or SiO<sub>2</sub> mask, paragraph 0067, 0085);

maintaining the temperature of the semiconductor substrate in the vacuum chamber about 250 °C (read on "above 160 °C", paragraph 0061, 0065, 0067);

introducing a hydrogen bromide containing gas into the vacuum chamber;  
igniting a plasma in the vacuum chamber;  
etching the semiconductor substrate with a gas comprising HBr (aka hydrogen bromide) (paragraph 0085).

Tanabe fails to disclose the step of forming a nitrogen containing layer on the semiconductor substrate from a nitrogen containing gas wherein the nitrogen containing gas having a volumetric flow rate that is less than the hydrogen bromide gas. In a semiconductor etching process, Athavale teaches to use nitrogen containing gas to form sidewall passivation and reactive gas including  $\text{Cl}_2$  or HBr to etch the semiconductor substrate (paragraph 0030-0031). Athavale further discloses the flow rate of nitrogen is less than the flow rate of the reactive gas including HBr or  $\text{Cl}_2$  (paragraph 0030-0031). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tanabe in view of Athavale by forming a nitrogen containing from a nitrogen containing gas having a flow rate less than the flow rate of reactive gas because this layer will promote sidewall passivation and preventing lateral attack.

Respect to claims 9-10, Tanabe discloses the semiconductor substrate includes InP-base compound (Tanabe's paragraph 0065). Respect to claims 11-12, Tanabe discloses the step of performing the etching process with an inductively coupled plasma etching system (Tanabe's paragraph 0001, Fig 1, Fig 11). Respect to claim 13, Tanabe discloses the etching rate in the range of 1-5  $\mu\text{m}/\text{min}$  (Fig 6). Respect to claim

14, Tanabe discloses the pressure is greater than 0 Pa and less than 4 Pa (fig 3D, 0-30 mTorr, within applicant's value).

### ***Response to Arguments***

4. Applicant argues, that Pierson teaches, "the amount of nitrogen gas added must exceed the volumetric measure of chlorinated gas in sccm. See Paragraph 19.

Therefore, Pierson et al. teach away from the current invention". This argument has been fully considered and is persuasive. Therefore, the examiner does not use Pierson in this office action. However, upon further consideration, a new ground(s) of rejection is made in view of Tanabe and Athavale et al.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Binh Tran*

Binh X. Tran